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Kuetz. accompany "Notes on British Characeæ" by H. and J. Groves in the December *Journal of Botany*.—The two delayed plates illustrating a paper on *Cinchona Ledgeriana* (from Bolivia), by Henry Trimen in the November *Journal of Botany*, appear in the December number. They are excellently done.

### ZOOLOGY.

IS THE HUMAN SKULL BECOMING THINNER?—If the doctrines of evolution are true, and the evidence supporting them is of a convincing character, questions relating to the operation of the laws by which improvement or degradation results, become of particular importance when applied to the human race, and it is a matter of serious inquiry whether, under the altered conditions of civilization, causes may not be at work which operate to the disadvantage of the whole organism, by detracting from the efficiency of a part?

According to the theory as expounded by Darwin and others, we have the tendency of all organisms to accommodate themselves to their environment, and to adapt themselves to altered circumstances within certain limits, this principle of adaptation in co-operation with heredity, or the tendency of the offspring to inherit the characteristics of its progenitors, are made to account for much of the otherwise inexplicable phenomena with which we are surrounded.

Now according to this doctrine, an organism is endowed with ability to succeed amid certain surroundings—in the higher vertebrates, for example, we have the framework of bone, with all its beautiful applications of the principles of mechanics, so arranged as to prevent to a great extent injury of the important organs, and when we come to the brain, we find it enclosed in a rigid covering, capable of resisting a considerable degree of violence without being fractured, and evidently intended to protect the delicate organ it contains.

If we accept the tenets of evolutionists, a race adapted to certain circumstances, will, if those circumstances be altered, become modified in a corresponding degree, and retrogression may result as well as improvement, and this modification may be confined to a certain part or organ. Let us consider, therefore, what forces have exerted their influence upon this casket of the brain.

First, natural selection in the case of those creatures that engaged in fierce combats, would tend to eliminate those individuals with frail craniums, and as man comes within the category of belligerent creatures, when barbaric warfare, and the dangers of the chase were common occurrences, natural selection would of course exercise a powerful influence in maintaining a standard of cranial strength. Then, too, in the presence of repeated violence, adaptation would undoubtedly provide a suitable armor for this delicate and important organ. And as it is difficult to conceive

how the weight of its contents or the action of its muscles can exert any considerable influence upon its greater portion in man, the above may be regarded as the principal agencies, for sexual selection is confined to capabilities of an active character, and attributes which are displayed, and would be inoperative upon a hidden part, the function of which is only passive.

In civilized man, however, at all events in the higher grades of modern civilization, natural selection may be said to exert no influence in this direction, war is too infrequent and engages too small a portion of mankind, while the forces with which it deals, are of a nature to alter the whole aspect of the case. And while adaptation undoubtedly operates, particularly among the laboring classes, upon other portions of the frame to maintain their rigidity, it is only in rare instances that the skull is called upon to support any greater pressure than that exerted by the head gear.

It is not to be overlooked in this connection, that among semi-civilized peoples where the facilities for transportation are limited, the head is often made to support considerable weights, and except where rigid rules of caste prevent the intermarriage of classes, the joint action of adaptation and heredity disseminate the effects of this custom throughout the community.

There probably never was a time in the history of the world, when the skull was subjected to so little violence, as since the introduction of modern methods of transportation, and when we recall the fact, that it was but a few centuries ago, that the most advanced nations of the present day were barbaric, it is too soon to look for any great change. Yet it is not uncommon to hear of cases of fracture of the skull, which are ascribed to its unusual thinness. May not these be the results of fortuitous coöperations of the agencies mentioned?

If the force of the position assumed is accepted, the logical conclusion is that we are approaching a time when the human cranium will become much thinner, so delicate, in fact, that it will be easily fractured, we may therefore expect a revival of natural selection, and an increase of cases of death from violence to the head.—*W. B. Cooper.*

HABITS OF THE FIERASFER, A BOARDER IN THE SEA-CUCUMBER.—The Holothurians or sea-cucumbers have been long known by fishermen to harbor a curious fish, to which Cuvier gave the name *Fierasfer*. Several species of it are known. The most common in the Mediterranean, the *Fierasfer acus*, has been recently made an object of special study by Professor Emery, at the zoölogical station at Naples.

To procure Holothurians tenanted by the fierasfer, it is necessary to seek the animals at a certain depth; those living near the shore do not usually contain them. The two Mediterranean species of holothurians, which are most frequently tenanted, are *Stichopus regalis* and *Holothuria tubulosa*. When these animals

are accumulated in certain quantity in the same tank, the little fishes ere long appear. According to Professor Emery, who has opened hundreds of holothurians in his search, the fierasfer is generally lodged in the cavity of the body. It penetrates first, as we shall see, by the anus into the intestine. Then it migrates into the pulmonary passages, the thin and delicate walls of which soon rupture in consequence, and allow the fish to pass into the peri-intestinal space.

When free, the fierasfer ordinarily swims in an oblique position, the head down and the tail curved towards the back. By undulatory movements of its ventral fin, it moves obliquely forward, keeping about the same level, or obliquely in the direction of the axis of the body. It is but a poor swimmer, and when placed in a tank along with other fishes it is soon devoured, being incapable of flight, of defending itself, or of hiding in a medium uninhabitable by it.

Swimming with its head downwards, the fierasfer explores the bottom of the water and the bodies lying there. If it comes upon a holothurian, it immediately shows some agitation, examines the object on all sides, and having reached one of the extremities, examines it attentively. If it be the head-extremity, the fish returns suddenly, and proceeds to the opposite end, by which the holothurian sucks in and expels the water necessary to its existence. Then commences a curious proceeding. In the time of expiration, when the holothurian is expelling water, the little fish, excited by this mechanical action, applies its snout strenuously to the anal orifice, then curves back its pointed tail over one side of its body, and by a rapid movement of recoil, introduces the tail into the rectum of the holothurian. This accomplished, the fish raises the anterior part of its body, while its tail remains pinched in the holothurian, and pushes itself further and further in with each movement of suction. After a time the anterior part enters in its turn, and the fish is completely inclosed in its host.

Professor Emery has sometimes seen a small fierasfer get into its position at once, while in other cases the progress of the fish is so slow that the patience of the observer is exhausted. While the general mode of introduction is that described, there may be some modifications. Thus the fierasfer may penetrate head-first, or, victim of a mistake, may endeavor, generally without success, to effect an entrance by the mouth of the holothurian.

The fierasfer is not necessarily solitary; on the contrary, it often shares its abode with two or three of its kind. Professor Emery has seen, in the Naples aquarium, seven fierasfers successively enter the same holothurian, causing their host injuries which proved fatal.

It has already been stated that the fierasfer does not remain in the intestine, which is difficultly habitable because of the quantity of sand in it. We have to note, however, that it always remains

near the anus, though which it protrudes its head, from time to time, in search of food. Thus it is not, in any way, either a parasite or a commensal, in the sense attached to these words in natural history—that is to say, it does not live at the expense of the holothurian, either consuming its substance or taking some of the food that animal has amassed for itself. Hence the earlier naturalists who studied the habits of the fish were mistaken in considering it as an example of parasitism by a vertebrate animal. The fierasfer is merely, as Professor Emery puts it, a lodger, or tenant.

According to Professor Semper, of Wurtzburg, however, there is on the coast of the Philippine islands, a small fish of the genus *Encheliophis*, closely allied to fierasfer, which, also living in holothurians, feeds on their viscera, and is, therefore, a true parasite.—*English Mechanic*.

HABITS OF THE MENOPOMA.—Having recently collected specimens of the common Menopoma (*M. alleghaniensis*) for Professor Ward's museum in Rochester, N. Y., I give some of my observations on its habits.

All my specimens were caught in the Loyalhanna creek, Westmoreland Co., Pa. It is well known to those accustomed to fish in the streams of this region, from its troublesome habit of taking bait placed in the water for nobler game. When thus hooked, its vicious biting and squirming, together with the slime which its skin secretes, render it exceedingly disagreeable to handle. It is often hooked in bottom fishing for catfish. Many anglers cut the hook off, rather than extract it, and the amphibian's flat head is often rendered still flatter by a lively application of the sportsman's boot heel.

In the early summer when the water is clear, Menopomæ are often to be seen on the pebbly bottom in considerable numbers. Once when fishing with some friends from off a large rock in the Loyalhanna creek, we saw quite a shoal of them moving sluggishly about among the stones on the bottom. They would quickly take our hooks baited with a piece of meat or a fish head. In one instance two large ones laid hold of the same bait and were promptly landed on the rock. In a few minutes we had a dozen. Last August I fished the same spot for them but without success. Acting on the advice of a "native" (which was to drop some bait—dead fish, &c., near certain rocks under which he insisted the "alligators" staid) I caught ten large specimens in a single morning, and ten more a few days later. Those taken were of various sizes, measuring from ten to eighteen inches in length. One taken by a friend was twenty-two inches long. Fishermen hereabouts say they have frequently caught hell-benders two feet long.

They are remarkably tenacious of life. I carried my specimens

six miles in a bag behind me on horseback, under a blazing hot sun, and kept them five weeks in a tub of water without a morsel to eat, and when I came to put them in alcohol they seemed almost as fresh as ever. During their confinement in the tub, two of the females deposited a large amount of spawn. This spawn was something similar to frog spawn in its general appearance, but the mass had not the dark colors of the latter. The ova were exuded in strings and were much farther apart than frog eggs. They were of a yellow color, while the glutinous mass which connected them had a grayish appearance. The spawn seemed to expand greatly by absorption of water. It lay in the tub among the animals for a week but was not disturbed by them.

The Menopona, here called "alligator" and "water dog," is an exceedingly voracious animal, feeding on fish, worms, crayfish, &c. Some of those taken by me disgorged crayfish shortly after being caught. Its large mouth which literally stretches "from ear to ear," takes in almost any bait not too large to be swallowed. May it not be a sort of scavenger of the water? It inhabits the Mississippi and Ohio rivers and their tributaries.—*Chas. H. Townsend.*

THE SPARROW PEST IN AUSTRALIA.—Through the kindness of a correspondent I have received an interesting official document showing that *Passer domesticus* has proved not less obnoxious in Australia than in this country. It is a folio of eleven pages, being the progress-report of a commission appointed by His Excellency, Sir W. F. D. Jervois, Major-General, &c., to inquire into and report upon the "alleged injuries by sparrows" together with an analysis of correspondence and minutes of proceedings of the commissioners, published in September, 1881, at Adelaide by order of the House of Assembly. "The commissioners appointed to inquire into the alleged damages caused by sparrows to horticulture and agriculture in South Australia, and into remedial measures, and to report thereon, having proof of the evil existing in great force, and over larger districts of country, and being convinced that their suppression is urgent before another harvest and fruit season sets in, and before another nesting season (now beginning) shall swell their numbers, beg to present a progress report," &c.

The analysis of correspondence on the questions of inquiry shows: 1. That the sparrow is established over an immense area in South Australia. 2. That sufferers in such area "cry for relief from sparrow depredations as if from a pest." 3. That the sparrows are increasing at an astonishing and alarming rate, their work being "done under conditions despairing to the cultivator, and under conditions that he cannot control; for the seed is taken out of the ground, the fruit-bud off the tree, the sprouting vegetable as fast as it grows, and the fruit ere it is ripe." 4. The cultivated plants attacked are apricots, cherries, figs, apples, grapes,

peaches, plums, pears, nectarines, loquats, olives—wheat and barley—peas, cabbages, cauliflowers and garden seeds generally. 5. All means of defence have hitherto proved inadequate. 6. The commissioners suggest in addition to the usual means of defence, the tender of rewards for sparrows' eggs and heads; the removal of gun-licenses for the season, poisoned water in summer, sulphur fumes under roosts at night, plaster of paris mixed with oatmeal and water. "It is further declared that the *united action* of all property holders, including the government, is *essential* to effective results."

The state of the case in Australia being no worse than it is in the United States, these sensible and energetic measures contrast favorably with the neglect and indifference we have shown in so practically important a matter, notwithstanding the unceasing protests of all competent judges, chiefly through our long-suffering national good-nature, partly through sickly sentiment, and in some slight degree through the ranting pseudo-zoöphilic of such persons as Mr. Henry Bergh, for example.—*Elliott Coues, Washington, D. C.*

**OCCURRENCE OF THE OPOSSUM IN CENTRAL NEW YORK.**—Dr. W. H. Gregg of Elmira informs me that an opossum was last spring taken about 6 miles from the city, being the first specimen known to him to have occurred in that locality, which is certainly beyond the usual range of the species as commonly understood.—*Elliott Coues, Washington, D. C.*

**THE CLAW ON THE "INDEX" FINGER OF THE CATHARTIDÆ.**—

DECEMBER 7, 1881.

*To the Editors of the American Naturalist.*

*Gentlemen:*—I read with much interest Dr. Shufeldt's article in your journal for November last, on the claw on the "index"<sup>1</sup> of the *Cathartidæ*, to the existence of which he had previously called my attention when I had the pleasure of making his acquaintance in Washington last month. Dr. Shufeldt certainly deserves great credit for being the first to detect a structure, which has previously, so far I am aware, escaped the notice of all observers. I may add that since my return I have been able to confirm the truth of Dr. Shufeldt's statements on specimens of *Cathartes aura* and *C. atratus* in my possession.

Allow me, as one perhaps more favorably situated than Dr. Shufeldt has been as regards the literature of ornithology, to call my friend's attention to Nitzsch's "Osteographische Beiträge zur Naturgeschichte der Vögel," published at Leipzig in 1881. In that<sup>2</sup> he will find an excellent account of the claw and phalanx in question as it exists in many other birds.

<sup>1</sup> The digit of the Avian manus called "index" by Professor Owen is now universally recognized by anatomists as really the pollex.

<sup>2</sup> "Ueber das Nagelglied der Flügelfinger, besonders der Daumen." pp. 89-97.

Nitzsch does not seem to have observed it in the *Cathartidæ*, but found it in *Haliaëtus albicilla*, *Tinnunculus alaudarius* and some others of the *Falconidæ*. It is very conspicuous in *Pandion*. In fact, the occurrence of such a claw is of very frequent occurrence in the class *Aves*, though by no means universal amongst them. Amongst birds in which it may be well seen, I may mention *Struthio* and *Rhea*, *Cypselus*, *Caprimulgus*, the *Rallidæ* and *Parridæ*. Such a claw must not be confounded, as has been done by some writers, with the long "spurs" covered by epidermic tissues, formed by outgrowths from the *metacarpal* elements, of most birds as *Parra*, *Palamedea*, *Plectropterus*, &c. In fact, the two may, as in *Parra* or *Plectropterus*, coëxist. Believe me, yours very truly,

W. A. FORBES,

*Prosecutor to the Zoölogical Society of London.*

A NEW DISTOMUM PARASITE IN THE EGG-SACKS OF APUS.—While opening the egg-sack of an *Apus lucasanus* from Kansas, my attention was attracted by a small cylindrical worm-like object attached to the walls of the interior of an egg-sack on the eleventh pair of feet.

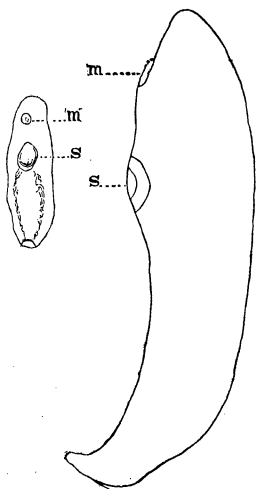


FIG. 1. — *Distomum* of *Apus*, side and ventral view; *m*, mouth; *s*, sucker. Much enlarged.

It is represented by the accompanying figure, which gives enlarged sketches of the side and under surface. The worm is  $1\frac{1}{4}$  of a millimeter in length, and  $\frac{4}{10}$  mm in thickness at the thickest part of the body, which is in the region of the sucker (*s*). Seen side-wise the body is moderately long and slender, a little curved and flattened on the concave side. The mouth (*m*) is situated near the end of the body, and is much smaller than the sucker (*s*). The anterior end of the body is not so much pointed as the posterior; the latter is somewhat produced, the end even somewhat incurved. The animal was white in color. This fluke may be called *Distomum apodis*. This is the first occurrence of any parasite on the members of this family (*Apodidæ*) of Phyllopods, and so far as we are aware the first instance of the occurrence of any parasitic worm in the Phyllopods in general.

Living as it does in the ovisack, it can hardly be called an internal parasite.—A. S. Packard, Jr.

ADDITIONAL NOTE ON THE EGG CASES OF PLANARIANS ECTOPARASITIC ON LIMULUS.—In the January number of this journal, by a curious coincidence, Dr. Gissler contributed a note covering in part the same ground as one by myself which appeared in the same issue. I desire to make a correction in regard to the supposed air-tubes alluded to by the former as occurring at the tips of



the egg-capsules. These are in fact nothing more than killed distorted protozoa of the genus *Epistylis* or *Zoöthamnium*, clusters of which I have frequently observed in the living condition on the ends of the egg-capsules in fresh material presenting almost precisely the appearance represented in Fig. 2 *b c*, of Gissler's note. They are present or absent according as opportunity may have been afforded for the protozoans to attach themselves, the oldest capsules and those from which the embryos had escaped, being the ones to which the *Vorticellinæ* had most often affixed themselves. At the time my note was written I did not think it worth while to mention the occurrence of the protozoa which are very common, the stalked forms especially. So numerous are these, in places, that to estimate their occurrence at one hundred per square inch of horizontal surface, we find the population of a square rod to be nearly four millions (more exactly 3,896,800). From what I have seen in the Chesapeake, this estimate, in many localities, would be very low, from which it may be inferred that the importance of the part played by the protozoa in the economy of the world of life is, like that of the earth-worm, not yet appreciated at its right value.—*J. A. Ryder.*

NOTES ON SOME FRESH-WATER CRUSTACEA, TOGETHER WITH DESCRIPTIONS OF TWO NEW SPECIES.—*Palæmon ohionis* Smith.—(*Palæmon ohionis*. Smith, S. I., Freshwater Crustacea, U. S. 640; Forbes, S. A., Bulletin Ills. Mus. Nat. Hist., No. 1, 5.) While seining for fishes in the vicinity of Vicksburg, Miss., during the past summer, I captured numerous specimens of this species. The largest specimens were taken in the open river with a small, fine-meshed, collecting seine. In some places they occur in enormous numbers. On the 4th of July we were in Louisiana, across the river from Vicksburg, seining in some ponds formed in the making of levées along Grant's canal. At a single draw of the net we brought out not less than a half bushel of these river shrimps. Considering their size and abounding numbers, they must constitute an important part of the food of the fishes of these waters. They are captured for bait, and are used to some extent for food; and I can, from actual experience, testify that they are not to be despised by the hungry hunter. My largest specimens agree exactly in size with those obtained by Professor Smith from the Ohio river at Cannelton, Ind. Many of the females were laden with eggs. The mandibles of this species, as in the case of many other crustaceans, are not perfectly symmetrical. The biting portions of the two mandibles are alike and tridentate. The triturating process of each is long, and stands out at right angles to the body of the mandible. That of the left mandible is truncated at nearly right angles; that of the left is quite oblique, so that a dentated edge is presented to the other mandible. Both molar surfaces are tuberculated.

*Palæmonetes exilipes* Stimpson.—(*Palæmonetes exilipes* Smith, S. I., loc. cit., 641; Forbes, S. A., loc. cit., 5.) I have collected this species in tributaries of the Tombigbee and Noxubee rivers, in Eastern Mississippi, in the Mississippi river at Memphis, in Pearl river at Jackson, and in the Chickasawha river at Enterprise, Miss. It is now known to occur as far north as Ecorse, Mich., in South Carolina and Florida, in Mississippi and in Illinois.

*Crangonyx lucifugus*, n. sp.—This is a small, rather elongated species, that was obtained from a well in Abingdon, Knox county, Illinois. As befits its subterranean mode of life, it is blind and of a pale color. In length the largest specimens measure about 6<sup>mm</sup>.

*Male*.—Antennulæ scarcely one-half as long as the body. The third segment of the peduncle two-thirds as long as the second; this, two-thirds the length of the first. Flagellum consisting of about fourteen segments. The secondary flagellum very short, and with but two segments. Antennæ short, only half as long as the antennulæ. Last two segments of its peduncle elongated. Flagellum consisting of but about five segments, and shorter than the last two segments of the peduncle taken together.

Second pair of thoracic legs stouter than the first. Propodite of first pair quadrate, with nearly a right angle between the palmar and posterior margins. Palmar surface on each side of the cutting edge, with a row of about six notched and ciliated spines, one or two of which at the posterior angle are larger than the others. The cutting edge is entire. Dactylopodite as long as the palmar margin, and furnished along the concave edge with a few hairs.

Propodite of the second pair of legs ovate in outline, twice as long as broad. The palmar margin curving gradually into the posterior margin. The cutting edge of the palmar surface uneven, and having near the insertion of the dactyl a square projection. The palmar surface also armed with two rows of notched and ciliated spines, five in the inner row, seven in the outer. Dactyl short and stout.

Two posterior pairs of thoracic legs longest of all and about equal to each other. All the legs are stout and their basal segments squamiform.

Postero-lateral angle of first abdominal segment rounded; of second and third, from obtuse-angled to right-angled.

First pair of caudal stylets extending a little further back than the second; these exceeding slightly the third. The peduncle of the first pair somewhat curved, with the concavity above, the rami equal and two-thirds as long as the peduncle. The peduncle of the second pair little longer than the outer ramus. Inner ramus nearly twice as long as the outer. Third pair of caudal stylets rudimentary, consisting of but a single segment. This somewhat

longer than the telson, broadly ovate, two-thirds as broad as long and furnished at the tip with two short spines.

Telson a little longer than wide, narrowing a little to the truncated tip, which is provided at each postero-lateral angle with a couple of stout spines.

*Female*.—In the female the propodite of the anterior pair of feet resembles closely that of the corresponding foot of the male. The palmar margin of the second propodite is less oblique than in the second foot of the male, and does not pass so gradually into the posterior margin. It is also destitute of the jagged edge and the square process of the male foot. There are fewer spines along the margin. One of the spines at the posterior angle is very long and stout.

This species appears to resemble *C. tenuis* Smith, but is evidently different. In that species, as described by Prof. S. I. Smith, the first pair of feet are stouter than the second, and have the palmar margin of the propodite much more oblique. The reverse is true of the species I describe. Nor do I understand from the description of *C. tenuis* that the posterior caudal stylets each consist of a single segment. There are some minor differences. From *C. vitreus*, judging from Prof. Cope's description in AMERICAN NATURALIST, Vol. VI, p. 422, it must differ in the caudal stylets. "Penultimate segment, with a stout limb with two equal styles," is a statement that will not apply to my species, whichever the "penultimate" segment may be.

*Crangonyx bifurcus*, n. sp.—General form and appearance those of the Western variety of *C. gracilis*. Length of specimens about 9<sup>mm</sup>. Eyes oval, black. Antennulæ scarcely half the length of the body. First two basal segments of the peduncle about equal in length; the first much the stouter; the third segment about two-thirds as long as the second. Primary flagellum about twice the length of the peduncle, consisting of about twenty-four segments. Secondary flagellum scarcely as long as the basal segment of the primary flagellum, consisting of but two segments. Antennæ about one-half as long as the antennulæ. Basal segments short, the first provided with a prominent process, which appears to be perforated (the opening of a gland?). Ultimate and penultimate segments of the peduncle elongated and equal in length. Flagellum shorter than the two distal segments of the peduncle and consisting of about eight segments. The antennæ furnished with about a dozen curious sensory organs; three of these on each of the two distal segments of the peduncle; the segments of the flagellum with one each, except the terminal three or four, which have none. These organs in alcoholic specimens resemble, under the microscope, a lanceolate or oblanceolate leaf having a midrib and parallel veinlets running from this to the margins.

Propodite of first thoracic foot subquadrate in outline; a very little longer than wide. Palmar surface somewhat oblique, armed

on each side of the cutting edge with about a dozen notched and ciliated spines. Two or three short, stout and serrated spines at the posterior angle. A number of stiff, slender hairs planted among the spines. Dactylopodite scythe-shaped, bent rather abruptly near the base, then straight, and finally incurved near the tip. Propodite of second foot more elongated than in the first foot, and with a more oblique palmar surface; armed with about fourteen spines along each side of the cutting edge. The first, second, and third abdominal segments have their postero-lateral angles drawn backward into a decided tooth.

Of the three pairs of caudal stylets, the first extends backward beyond the second; the second beyond the third. The latter consists of a stout peduncle and a single ramus, which is about two-thirds as long as the peduncle and provided with a few slender spines. There appears to be no inner ramus, but there is to be seen on the inner side of the ramus present a process of the peduncle that represents, perhaps, the inner ramus. There is, however, no involution of the integument at the base of this process. Telson elongated, twice as long as broad, the sides nearly parallel. The posterior border is provided with a notch that extends nearly three-fourths of the distance to the base. Each prong is armed at the tip with from three to five spines.

This species differs from *C. gracilis* more particularly in the form of the telson, and in the length of the outer ramus of the posterior stylets as compared with the peduncle. From *C. antennatum* Packard (AMERICAN NATURALIST, 1881, p. 880), it differs in the form of the telson, and in the much greater size of the eyes. Found by myself about 1st of April, 1880, in a rivulet flowing down the limestone hills into the Noxubee river, at Macon, Miss. Only four specimens were secured, all of which appear to be males.

The three species, *C. gracilis*, *C. bifurcus* and *C. lucifugus* present an interesting gradation in the forms of the posterior caudal stylets. In the first-named the outer ramus is twice the length of the peduncle, and the inner ramus is present, but rudimentary. In *C. bifurcus* the outer ramus is but two-thirds as long as the peduncle, while it is doubtful whether there is anything whatever to represent inner ramus. In *C. lucifugus* both the outer and inner rami are absent, and the peduncle itself is much reduced.—(*To be Continued*).—O. P. Hay, Irvington, Ind.

REVIVAL OF TARDIGRADES AFTER DESSICCATION.—The truth of the occurrence of this phenomenon has been denied by various observers, and the appearances explained by Ehrenberg as due to the development of fresh specimens from eggs left by the animals, which die in the process. Professor Yung, however, considers that his observation of the process, in a single specimen of *Milnesium*, proves the correctness of the old opinion. The specimen was taken from a ditch, contained eighteen eggs, and manifested

lively movements. It was left for five hours until quite dry, and all that could be seen of it under 350 diam., was a brown speck under the cover-glass. A drop of water was allowed to run beneath the latter. Almost immediately after it had reached the remains of the Tardigrade, a fine pellicle was evident, surrounding the brown speck and manifesting the general outlines of the body and ova. The normal wall then appeared, enclosing the contents of the intestine; the minutest details of the outer skin appeared; after twenty minutes the mouth with its fingers and tube, the jaws, and the feet were fully developed. Subsequently the parts connecting the jaws with the œsophagus came into view. No movements and no development of the ova were observed in the three hours occupied by these observations. The too close apposition of the cover-glass to the slide being now remedied, the animal was supplied plentifully with water, but, when searched for the next day, could not be found, having probably departed in search of more comfortable quarters, for the algae which had surrounded it were disturbed, and neither the remains of the jaws and skin, usually found after specimens have died, nor eggs, were discovered.

VARIATION IN *ÆQUOREA FORSKALEA*.—Professor C. Claus, according to the Journal of the Royal Microscopical Society of London, while giving an account of this Adriatic medusa, takes the opportunity of making some criticisms on Professor Haeckel's classification of the *Æquoridæ*. A careful study of this form has shown Claus that it is subject to extreme variation; variations so great as to have led Professor Haeckel to make a number of genera and sub-genera for their reception. It is not possible to abstract a critical paper of this kind, and we must be content to direct attention to the following points. Claus finds that the color varies with age and sex; the young may well be called *vitrina*, as Gosse called them; later on blue pigment-granules may appear in the ectoderm, and especially in the gonads of the male, while the female may take on a more or less reddish coloration (the *A. violacea* of Milne Edwards). The radial canals vary in number from just over fifty to nearly eighty. The form and size of the mouth-lips depend on the state of contraction of the specimen, on its age, and on the breadth of its umbrella. Altogether, according to Professor Claus, Haeckel would seem to have afforded a very interesting proof of the origin of species by variation.

DEVELOPMENT OF THE STERLET.—A résumé of Professor W. Salensky's Russian paper on this subject appears in the Journal of the Royal Microscopical Society. The segmentation of the egg is on the amphiblastula type; the gastrula, however, is an archigastrula. In the endodermal origin, and in the primitive formation of its mesoderm, the sterlet resembles *Amphioxus*, but

it differs from it in having the chorda dorsalis derived from the mesoderm, and not from the endoderm. There is no real difference in the mesodermal layer of these two forms, and intermediate stages between the two conditions have been observed in Elasmobranchs. So, also, the author thinks that the segmentation of the ovum presents a transitional arrangement between the bony fishes and Plagiostomes on the one hand, and the Cyclostomata and Amphibia on the other.

ZOOLOGICAL NOTES.—The view that the Brachiopods are shelled worms, which has been so fully discussed and insisted upon by Professor E. S. Morse, appears to be gaining ground. Drs. O. and R. Hertwig in their lengthy essay on the coelom theory agree with Gegenbaur that the Brachiopods have little more in common with the molluscs than the possession of a shell, the latter being wholly different from that of ordinary bivalves, and that they have taken their origin from the stem of the worms, especially the Chaetopods.—It appears that two shells from Lake Tanganyika, in Central Africa, described in the Proceedings of the Zoological Society of London, and, according to a note by Dr. C. A. White in *Nature*, generically identical with the *Pyrgulifera humerosa* of Meek, from the Laramie group, an extensive brackish water formation in western North America; these beds being transitional between the Mesozoic and Cenozoic series.—In a paper recently read by M. Yung before the French Academy on the influence of the nature of food on sexuality, he states that he fed separate sets of tadpoles with fish, meat, coagulated albumen of hen's eggs, yellow of eggs, and with a mixed diet. These alimentations do not appear to have had a very distinct influence on the sex; but along with M. Born's experiments, those of M. Yung support the idea that a special diet afforded to young tadpoles from the time of leaving the egg, favors the development of a female genital gland. This is the reverse of that arrived at by Hoffman, who found that deficiency of nourishment resulted in the case of plants, in the production of an excess of males. In a recent memoir entitled "*Metagenesis und Hypogenesis von Aurelia aurita*," Professor Haeckel by keeping a number of specimens in his aquarium, has observed certain phenomena in the mode of reproduction, which deviate from those which usually occur. Besides *metagenesis* or the ordinary development by alternate generation, he observed a direct development which he calls *hypogenesis*. This is effected by the gastrula developing directly into an Ephyra; the Scyphistoma and Strobila stages being suppressed. It remains to be seen whether this abbreviated mode of development occurs in a state of nature. Two large plates crowded with figures of generous size render the meaning of the text very clear. Indeed Haeckel's style is as clear and beautiful as his drawings and we wish all German scientific papers were as easy to read.—A fishing bat which lives in the caves at Mono island,

Trinidad, is described in *Nature*. These queer creatures catch fish at night in a manner not very clearly made out.—Dr. Kobelt, the malacologist, who has visited North Africa and Spain to study the mollusks of the two countries reports, says *Nature*, that it may be safely assumed that the connection was not confined to the Straits of Gibraltar, but extended at least as far as the meridian of Oran and Cartagena.—M. Kunstler has found a flagellate Infusorian very much like *Noctiluca* living in fresh water.—It appears that 38 naturalists worked at the Roscoff sea-side laboratory during 1881 against 27 in 1880. The number of foreigners is eight.—The French dredging expedition, in *Le Travailleur*, under the direction of A. Milne Edwards, has published a preliminary report. Many crustaceans, and star-fish, such as *Brisinga*, and other animals were found, these being Atlantic forms new to the Mediterranean. "In general the Mediterranean is not to be thought a distinct geological province; its inhabitants have probably come from the ocean, and their development and reproduction have been more active than in their place of origin. Some have been slightly modified. The more we get to know of oceanic productions off the coast of Portugal, Spain, Morocco, and Senegal, the more do differences from Mediterranean animals disappear." (*Nature*.)—A species of fluke (*Distomum cirrigerum*) have been found by G. Zaddach in the crayfish, where they occur as blackish spots on the testes, and in greater numbers in the muscles of the hinder part of the abdomen. The author, says the *Journal* of the Royal Microscopical Society, comes to the somewhat remarkable conclusion that in *Distomum isostomum*, another fluke of the crayfish, the sexually mature forms succeed one another.

#### ENTOMOLOGY.<sup>1</sup>

ON SOME CURIOUS METHODS OF PUPATION AMONG THE CHALCIDIDÆ.—(*Concluded from the January number*.)—The mines of *Lithocolletis fitchella* Clem., at Washington, contain oftentimes a most interesting object, which I have never yet seen described. Imagine a short, slender chain of small, closely welded brown dipterous puparia and you will have the exact appearance. Such a chain I have often found in the center of a mine of the *Lithocolletis*, supported by the silken threads which the larva of the latter always spins prior to pupation. The number of individuals in a chain is always quite constant, never varying more than from ten to thirteen, and not a trace of any other occupant of the mine is to be seen, no matter how careful the examination may be.

Finding many specimens in the course of a winter I racked my brains for a long time, trying to find out what they were. I had settled in my mind that they were dipterous, though I knew of

<sup>1</sup> This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.